

REMARKS

In response to the Office Action mailed May 18, 2005, Applicants respectfully request reconsideration. Claims 1-56 were previously pending in this application. Claims 1-6, 10-21, 33, 39-41 and 51 have been amended. No new matter has been added.

I. Comments on Election

In the Amendment and Response to Restriction Requirement mailed on March 8, 2005, Applicants elected the Group I for examination, without traverse. In addition, Applicants amended the claims such that the claims of Group II depend either directly or indirectly from claims 1 or 11 (deemed linking claims in the Office Action mailed February 8, 2005). Claim 56 (Group III) was amended to depend from independent claim 39, which belongs to elected Group I. Accordingly, as stated during the March 8th Amendment, all pending independent claims (claims 1, 11, 39, and 51) are now linking claims or claims belonging to elected Group I. Specifically, claims 1 and 11 were deemed linking claims and claims 39 and 51 were deemed Group 1 claims in the Office Action mailed February 8, 2005.

The Examiner indicates that, although both the Group I claims and the linking claims have been examined, Applicants should limit their response to claims that relate to the Group I claims or the linking claims if Applicants believe that these do not represent patentably distinct inventions (May 18, 2005 Office Action at pages 3-4). Without representation as to whether any of the examined claims represent "patentably distinct inventions," Applicants have addressed all examined independent claims in the present Response. As set forth in M.P.E.P. § 809, "linking claims must be examined with the invention elected, and should any linking claim be allowed, the restriction requirement must be withdrawn." Thus, it is believed to be proper for the Examiner to examine both the claims to the elected invention and the claims deemed linking claims.

Moreover, as indicated in M.P.E.P. § 803, "if the search and examination of an entire application can be made without serious burden, the examiner must examine it on the merits, even though it includes claims to independent or distinct inventions." Since the Examiner has searched and examined all pending independent claims, there is not believed to be any serious

burden involved in the Examiner considering all Applicants' remarks as to the examined claims. Thus, Applicants believe that continued examination of all independent claims is appropriate, irrespective of whether they relate to independent or distinct inventions.

Finally, Applicants note that the Office Action presents comments on the apparent patentability of claims 8 and 9 over claim 1, and on whether claims 2 and 3 present a unique improvement over the prior art (May 18, 2005 Office Action at page 3). As they do not form the basis of a rejection, Applicants have not specifically responded to the comments. Nevertheless, Applicants would like to clarify for the record that they do not accede to the propriety of these comments.

II. Comments on Information Disclosure Statement

The Office Action indicates that "where the IDS citations are submitted but not described, the examiner is only responsible for cursorily reviewing the references," citing the Guidelines for Reexamination of Cases in View of *In re Portola Packaging, Inc.*, 110 F.3d 786, 42 USPQ2d 1295 (Fed. Cir. 1997), 64 FR at 15347, 1223 Off. Gaz. Pat. Office at 125 (response to comment 6). While Applicants have reviewed the cited guidelines, Applicants note that they appear to be guidelines for reexamination of cases. Thus, Applicants would like to clarify for the record that the guidelines cited by the Examiner appear to be inapplicable. The Examiner is respectfully requested to fully consider the information submitted in the information disclosure statement in a manner consistent with his obligations, if the Examiner has not already done so.

III. Objections to the Claims

Claim 10 is objected to as allegedly failing to limit the subject matter of the previous claim. Claim 10 has been amended to exclude the negative limitation, which is believed to address the Examiner's concern.

IV. Rejections of Claims Under 35 U.S.C. § 112

Claims 10, 28, and 39-50 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. These rejections are addressed below.

a. Claim 10

Claim 10 is rejected as being indefinite because the limitation of “no more than one calibration temperature” amounts to a negative limitation. As discussed above, claim 10 has been amended to exclude the negative limitation. Accordingly, withdrawal of the rejection is respectfully requested.

b. Claim 28

With respect to claim 28, the Examiner appears to suggest that it is improper to define “receiving scene radiation via the pixel at a third time,” if the claim or corresponding independent claim does not recite “receiving scene radiation via the pixel” at first and second times. Applicants have specifically referred to “a third time,” rather than “a first time,” because “a first time” has already been defined in the claim and is not one and the same as “the third time.” Thus, Applicants do not perceive any indefiniteness in the claim, and therefore request that the rejection be withdrawn or that the Examiner suggest alternate language if he continues to believe that the claim is indefinite.

c. Claim 39

The Office Action rejected claim 39 as having insufficient antecedent basis for the recitation of “the pixel.” Claim 39 has been amended to correct this deficiency. Accordingly, withdrawal of this rejection is respectfully requested.

Claim 39 is also rejected as omitting steps or structure that put the method into context. Applicants have amended claim 39 to recite the context of the method in the preamble of the claim. However, Applicants have not included additional steps in the claim, as Applicants do not believe, and the Examiner does not appear to assert, that claim 39 is unclear in any way. As suggested in suggested in M.P.E.P. § 2173.04, breadth of a claim should not be equated with indefiniteness. *In re Miller*, 441 F.2d 689, 169 USPQ 597 (CCPA 1971). As stated therein, “[i]f the scope of the subject matter embraced by the claims is clear, and if applicants have not otherwise indicated that they intend the invention to be of a scope different from that defined in the claims, then the claims comply with 35 U.S.C. 112, second paragraph.” Thus, claim 39 is believed to comply with 35 U.S.C. § 112, second paragraph.

d. Claim 40

Claim 40 as objected to as reciting an act that is subject to different interpretations. Claim 40 has been clarified. Accordingly, withdrawal of this rejection is respectfully requested.

IV. Rejections of Claims Under 35 U.S.C. § 102

Claims 1-5, 8-9, 11-14, 16-19, 39, and 51-55 are rejected under 35 U.S.C. § 102(e) as being anticipated by Howard (U.S. Patent No. 6,433,333). These rejections are addressed below in connection with independent claims 1, 11, 39, and 51.

a. Discussion of Howard

Howard describes an algorithm for achieving stable operation of infrared-sensitive focal plane array sensors without the need for active temperature stabilization (Col. 1, lines 47-51). During an initial calibration procedure, measurements of the focal plane array's detector element responses to infrared black body source temperatures are performed at several sensor temperatures (Col. 6, lines 8-17 and 25-27). Based on these measurements, response and offset correction coefficients are calculated and stored into sensor memory (Col. 6, lines 4-7). For focal plane having a nearly linear temperature-dependent response, these coefficients may be used to perform a linear interpolation of response and offset correction coefficients to be applied to a video input signal based on a current operating temperature of the focal plane (Col. 1, lines 51-67; Col. 3, lines 59-62). The operating temperature of the focal plane may be determined in several ways, such as a temperature sensing device located in the same vacuum package as the focal plane array (Col. 5, lines 6-11).

b. Discussion of Applicants' Invention

As set forth in Applicants' specification at pages 32-34, Applicants have appreciated that calibration operations may be performed in an imaging system without generating linear approximations of offset error variation and gain variation in an initial sensor calibration procedure. In particular, Applicants have appreciated that offset error variation and gain variation may be determined during operation of a camera, without the requirement of factory calibration conditions (e.g., a particular calibration temperature or a radiating black body). One

benefit associated with determining offset error variation and gain variation during operation of a camera is that the initial sensor calibration procedure need only be performed using a single calibration temperature, whereas the generation of linear approximations requires at least two calibration temperatures. Performing the initial calibration procedure using one temperature saves the cost and time associated with performing a factory calibration procedure at one or more additional calibration temperatures. Another benefit associated with determining offset error variation and gain variation during operation of a camera is the ability to reduce the frequency of shutter operations to recompute the fine offset table.

One embodiment of the invention is directed to the generation of one or more offset calibration parameters after the initial sensor calibration procedure using, in part, a temperature of the sensor when exposed to both ambient and scene radiation. According to one exemplary implementation, an offset calibration parameter is generated based on a gain value for a pixel, together with a temperature of the sensor, wherein the temperature is measured during the incidence of scene radiation to the pixel.

The above summary of one aspect of the present invention is provided merely for the Examiner's convenience, and is not intended to characterize any of the independent claims. Therefore, the Examiner is requested not to rely upon the summary characterization above, but to closely examine each of the independent claims to ensure that each distinguishes over the references of record for the reasons discussed below.

c. Claim 1

As amended, claim 1 recites an imaging apparatus, comprising a plurality of pixels to detect radiation and to output image signals based on the detected radiation, a temperature sensor to detect an ambient temperature, and means, coupled to the plurality of pixels and the temperature sensor, for determining a calibration parameter of a pixel during operation of the imaging apparatus, *based on at least a first ambient temperature of the pixel and a second ambient temperature of the pixel, each measured after an initial calibration procedure.*

As discussed in Section IV(a), above, Howard describes performing a linear interpolation of response and offset correction coefficients based on (1) calibration coefficients derived from measurements performed at several infrared black body source temperatures during an initial

calibration procedure, and (2) an operating temperature of the focal plane, measured after the initial calibration procedure. Measurement of the operating temperature of the focal plane is performed not to obtain additional calibration data for the camera, but rather to update the response and offset correction coefficients based on a current operating temperature using the calibration data obtained during the initial calibration procedure. Accordingly, multiple measurements of the ambient temperature of pixels of the focal plane during operation of the camera are not necessary, as additional calibration data is not obtained. Thus, Howard does not disclose or suggest means for determining a calibration parameter of a pixel during operation of the imaging apparatus, based on at least a first ambient temperature of the pixel and a second ambient temperature of the pixel, each measured after an initial calibration procedure.

In view of the foregoing, claim 1, as amended, patentably distinguishes over Howard. Accordingly, withdrawal of the rejection of claim 1 under 35 U.S.C. §102 as being anticipated by Howard is respectfully requested. Claims 2-10 and 33-38 depend from claim 1, and are patentable at least on basis of their dependency.

d. Claim 11

As amended, claim 11 recites a method of calibrating an imaging system comprising a thermal sensor. The method comprises an act of determining a calibration parameter of a pixel of the thermal sensor during operation of the imaging apparatus, *based on at least a first ambient temperature of the pixel and a second ambient temperature of the pixel, each measured after an initial calibration procedure.*

For reasons similar to those discussed in connection with claim 1, Howard does not disclose or suggest determining a calibration parameter of a pixel of a thermal sensor during operation of an imaging apparatus, based on at least a first ambient temperature of the pixel and a second ambient temperature of the pixel, each measured after an initial calibration procedure.

In view of the foregoing, claim 11, as amended, patentably distinguishes over Howard. Accordingly, withdrawal of the rejection of claim 11 under 35 U.S.C. §102 as being anticipated by Howard is respectfully requested. Claims 12-32 depend from claim 11, and are patentable at least on the basis of their dependency.

e. Claim 39

As amended, claim 39 recites a method of calculating an offset calibration parameter of a pixel of a camera. The method comprises acts of determining a gain of the pixel during a period of operation of the camera between first and second times, after an initial calibration procedure, exposing the pixel to both scene and ambient radiation at a third time, measuring an ambient temperature of the pixel at the third time, and calculating the offset calibration parameter of the pixel using the gain of the pixel between the first and second times and the ambient temperature of the pixel at the third time.

Howard explains that calibrated response and offset correction coefficients are measured and stored during an initial calibration procedure, before operation of the camera (Col. 1, lines 60-65). Thereafter, response and offset correction coefficients may be interpolated using the calibrated response and offset correction coefficients and the sensor's operating temperature (Col. 2, line 67 – Col. 3, line 4). Thus, Howard does not disclose or suggest determining a gain of the pixel during a period of operation of the camera between first and second times, after an initial calibration procedure, nor calculating the offset calibration parameter of the pixel using the gain of the pixel between the first and second times and an ambient temperature of the pixel at a third time.

In view of the foregoing, claim 39, as amended, patentably distinguishes over Howard. Accordingly, withdrawal of the rejection of claim 39 under 35 U.S.C. §102 as being anticipated by Howard is respectfully requested. Claims 40-50 depend from claim 39, and are patentable at least on the basis of their dependency.

f. Claim 51

Claim 51 recites an imaging apparatus, comprising at least one pixel to detect radiation and to output image signals based on the detected radiation, a temperature sensor to detect an ambient temperature, and means for calculating an offset calibration parameter for the at least one pixel using a gain of the at least one pixel during a period of operation of a camera between first and second times after an initial calibration procedure, and an ambient temperature at a third time, wherein the pixel is exposed to both scene and ambient radiation at the third time.

As discussed in connection with claim 39, Howard describes that calibrated response and offset correction coefficients are measured and stored during an initial calibration procedure and,

thereafter, response and offset correction coefficients are interpolated using the calibrated response and offset correction coefficients and the sensor's operating temperature. Thus, Howard does not disclose or suggest means for calculating an offset calibration parameter for at least one pixel using a gain of the at least one pixel during a period of operation of a camera between first and second times after an initial calibration procedure, and an ambient temperature at a third time.

In view of the foregoing, claim 51, as amended, patentably distinguishes over Howard. Accordingly, withdrawal of the rejection of claim 51 under 35 U.S.C. §102 as being anticipated by Howard is respectfully requested. Claims 52-53 depend from claim 51, and are patentable at least on the basis of their dependency.

VI. Rejections of Claims Under 35 U.S.C. §103

Claims 6-7, 10, 15, 20, and 40-41 were rejected under 35 U.S.C. §103(a) as being obvious over Howard. Claims 21-38, 42-50, and 56 were rejected under 35 U.S.C. §103(a) as being obvious over Howard in view of Butler (WO 01/84118 A2).

Each of these claims depends from an independent claim addressed above. Accordingly, for the sake of brevity, Applicants believe that it is unnecessary at this time to individually argue the allowability of these claims, and reserve the right to specifically address the patentability these claims in the future, if deemed necessary.

CONCLUSION

A Notice of Allowance is respectfully requested. The Examiner is requested to call the undersigned at the telephone number listed below if this communication does not place the case in condition for allowance.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicants hereby request any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to Deposit Account No. 23/2825.

Respectfully submitted,
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